Acta Arachnologica, 58(2): 69–85, December 31, 2009

Revision of the *Cybaeus hiroshimaensis*-group (Araneae: Cybaeidae) in western Japan

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Abstract — A group of small-sized species of the genus *Cybaeus* in western Japan are reviewed and listed under the name *Cybaeus hiroshimaensis*-group on the basis of genital morphology, retreat type and geographic distribution. The species group contains eleven species, four of which are described as new: *C. okumae, C. sasayamaensis, C. nagaiae* and *C. nagusa*. New records of the other seven species are provided: *C. hiroshimaensis* Ihara 1993, *C. gonokawa* Ihara 1993, *C. tsurusakii* Ihara 1993, *C. nojimai* Ihara 1993, *C. okayamaensis* Ihara 1993, *C. taraensis* Irie & Ono 2001 and *C. biwaensis* Kobayashi 2006. The *hiroshimaensis*-group is distributed over western Japan, corresponding to the western part of Honshu and northern Kyushu. Distributional ranges of species in the group are parapatric one another, though sometimes they partially overlap. They show remarkable diversity in the genital morphology. This group is also characterized by having the silken tube-like retreat with three terminal openings, instead of two in most other Japanese species of *Cybaeus*. In addition, *Dolichocybaeus* Kishida in Komatsu 1968 and *Heterocybaeus* Komatsu 1968 are newly synonymized with *Cybaeus*.

Key words — *Cybaeus, hiroshimaensis*-group, geographic distribution, genital morphology, diversity of genitalia, new species

Introduction

The genus *Cybaeus* L. Koch 1868 shows enormous species-level diversity in Japan, due to their considerable body size variability and remarkable geographic differentiation. However, the genus still abounds in undescribed species and thorough revision is needed to understand process of the species differentiation of the group in the Japanese Islands.

In my previous paper (Ihara 1993) I described following five small-sized species of the genus from the Chugoku district, western Honshu: *Cybaeus hiroshimaensis, C. gonokawa, C. tsurusakii, C. nojimai* and *C. okayamaensis*. Morphological similarity and the distributional ranges, which are mutually allopatric or parapatric, of these species suggest that they constitute a superspecies (Ihara 1993). After the publication, I have collected several additional specimens, which can be safely identified as members of the superspecies, from the same region and the two adjacent areas, Kyushu and the Kinki district. These include specimens that can be identified as two recently identified species: *C. taraensis* Irie & Ono 2001 and *C. biwaensis* Kobayashi 2006. These two species can be undoubtedly regarded as members of the superspecies by their small size, morphology and the type of retreat, although these authors did not mention phylogenetic relationship to the other Japanese species of the genus *Cybaeus*. In addition to these, I have obtained specimens which can be regarded as members of the superspecies but cannot be designated any known species from the Kinki district of Honshu and the northern part of Kyushu.

In this paper, I will describe or review a total of eleven species of the superspecies, of which four (*Cybaeus okumae, C. sasayamaensis, C. nagaiae* and *C. nagusa*) are new, under a taxon which is newly designated as the *Cybaeus hiroshimaensis*-group. Species of the group are the smallest among each of the local species assemblage (Ihara 2003, 2004, 2007; Ihara & Nojima 2004) in western part of Honshu and northern Kyushu, Japan. They can be recognized as members of a single monophyletic group, due to their morphological similarities, retreat type and geographic distributional pattern. The geographical range of the group consists of small patches occupied by each species, which are allopatric or parapatric with each other. Hence the *hiroshimaensis*-group corresponds to a superspecies which has diverged as a result of allopatric speciation due to their low dispersal abilities. They show enormous diversity in the genital morphology, though they look very similar one another in the general feature.

Materials and Methods

Morphological examinations

All the measurements were made for the specimens immersed in 80% ethanol under a stereo dissecting microscope with an ocular micrometer. Female genitalia removed from

the abdomen were cleared in hot 10% KOH and 3% H_2O_2 according to the method described in Komatsu & Yaginuma (1968) to observe internal structure of the genitalia.

Terminology is mostly consistent with current system adopted by Ubick et al. (2005). That of female genital structure follows Bennett (2006). Arrangement of the spines on legs refers as proposed by Komatsu (1968).

The type specimens designated in this paper are deposited in the National Museum of Nature and Science, Tokyo (NSMT). Other specimens are in my personal collection. Collecting data of specimens in descriptions will be given by the following order: locality, altitude if available, number of individuals, date collected, and name of the collector (KN＝Koichi Nojima, NT＝Nobuo Tsurusaki, YI＝Yoh Ihara).

Recognition of species

Identification of each species in the *hiroshimaensis*-group relies mainly on morphology of male palp and female genitalia. I defined a geographical form as an aggregation of populations which are morphologically closely similar and geographically closely distributed one another. I treat a series of geographical forms within the *hiroshimaensis*-group as distinct biological species on the basis of presence of sufficient morphological gaps in genital morphology.

Family Cybaeidae Banks 1892

Genus *Cybaeus* L. Koch 1868

Cybaeus L. Koch 1868, p. 46. Type species: *Cybaeus tetricus* (C. L. Koch, 1839) (＝originally *Amaurobius tetricus*). Yaginuma 1962, p. 34; Lehtinen 1967, p. 218; Yaginuma 1977, p. 392; Yaginuma 1986, p.142.

Bansaia Uyemura 1938, p, 136. Type species: *Bansaia nipponica* Uyemura 1938.

Heterocybaeus Komatsu 1968, p. 13. Type species: *Heterocybaeus ryusenensis* Komatsu 1968. Yaginuma 1970, p. 663; Platnick 2009. **NEW SYNONYMY**. (see "Discussion" for the synonymy)

Dolichocybaeus Kishida in Komatsu 1968, p. 16. Type species: *Dolichocybaeus* (generic nomen nudum) *ishikawai* Kishida in Komatsu 1961. Yaginuma 1970, p. 662; Platnick 2009. **NEW SYNONYMY**. (see "Discussion" for the synonymy)

The *hiroshimaensis*-group of the genus *Cybaeus*

Species included

The following eleven forms are treated as valid species: *Cybaeus hiroshimaensis* Ihara 1993, *C. gonokawa* Ihara 1993, *C. tsurusakii* Ihara 1993, *C. nojimai* Ihara 1993, *C. okayamaensis* Ihara 1993, *C. taraensis* Irie & Ono 2001, *C. biwaensis* Kobayashi 2006, *C. okumae* n. sp., *C. sasayamaensis* n. sp., *C. nagaiae* n. sp., and *C. nagusa* n. sp.

Geographic distribution

Figure 1 shows distributions of these small-sized species in the study area. The *hiroshimaensis*-group is distributed over western Japan, corresponding to the western Honshu and northern Kyushu. The distributional range of the group does not probably extend to Shikoku and the Kii Peninsula, southernmost part of central Honshu. *Cybaeus*

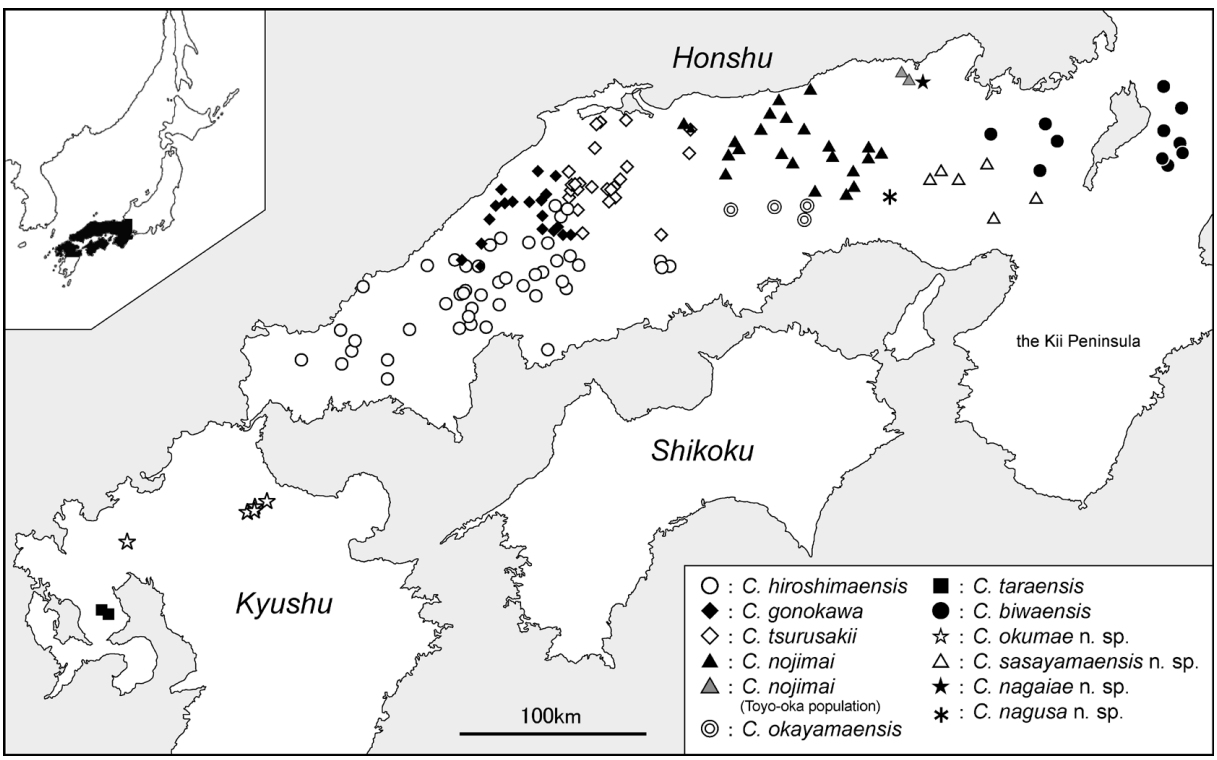

Fig. 1. Distribution of the *hiroshimaensis*-group of the genus *Cybaeus*, in western Japan (slightly modified Ihara 2008).

hiroshimaensis, C. gonokawa, C. tsurusakii, C. okayamaensis, C. nojimai, C. sasayamaensis, C. nagaiae, C. nagusa and *C. biwaensis* are endemic in Honshu, *C. taraensis* and *C. okumae* in Kyushu. The geographical range of the group is a mosaic of small ones occupied by each species. It gives essentially a parapatric pattern to the distribution except for some cases of partial overlap (e. g. *C. hiroshimaensis* vs *C. gonokawa* in northeastern part of Hiroshima Prefecture; *C. tsurusakii* vs *C. nojimai* in Mt. Daisen, Tottori Prefecture).

Retreat type

This group is characterized by their unique triangular retreats (Fig. 2). The silken tube-like retreat of the group has three terminal openings, while most of Japanese *Cybaeus* species have two terminal openings like that of *C. jinsekiensis* (Ihara 2006). The retreat of the group is nearly equilateral triangle, and show intermediate conditions between Y-shaped (as *C. ishikawai* in Komatsu 1961) and hexagonal in shape (as *Heterocybaeus* in Komatsu 1968).

Diversity of genital morphology

The *hiroshimaensis*-group shows conspicuous diversity in the male palp (Ihara 2008, fig. 13) and female genitalia (Fig. 3 and Ihara 2008, fig. 14) compared with those of the *kuramotoi*-group (Ihara & Nojima 2004) and the *miyosii*-group (Ihara 2003). There is an obvious difference of their genital morphology between the two neighboring species. The distinct morphological gaps between the two species among the *hiroshimaensis*-group suggest that the reproductive isolations are sufficiently established.

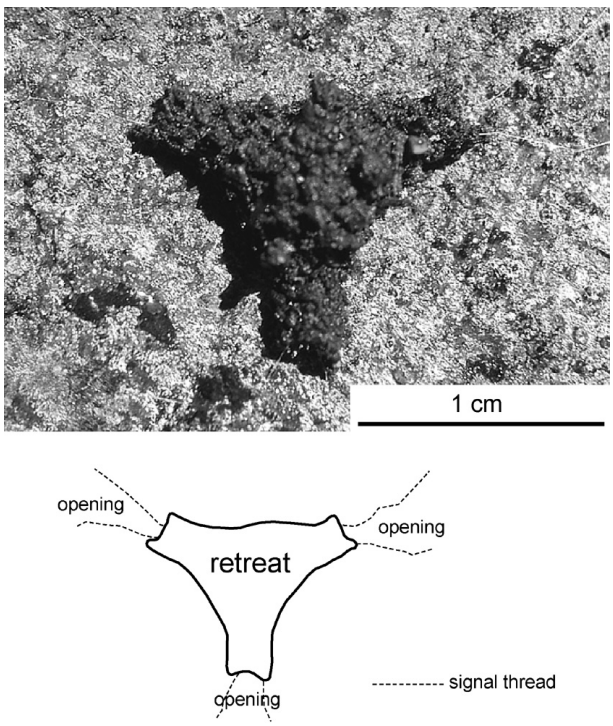

Fig. 2. A silken tube-like retreat with three openings in *Cybaeus okumae* under surface of stone.

Diagnostic characters

Species belonging to the group are small in size (2.5−3.5 mm in body length) and pale in color. Within the group, diagnosis of each species relies primarily upon genital morphology of both sexes. In male, principal differences are in the shapes of retrolateral patellar apophysis and apical element of conductor (the same as proximal end of tegular apophysis by Ubick et al. 2005). Shape of tibia with retrolateral apophysis is also effective in identification. In females, they are distinguishable each other by epigynum, particularly shape of atrium and internal structure seen through the integument. Direct observation of internal structure ensures discrimination of species.

General feature of the group

The general feature of the species belonging to this group is as follows.

Head region narrow, relatively longer in female than male. Head width / thoracic width smaller in male than female (Fig. 4, cf. B and C). Thoracic region as high as head region (Fig. 5B, D). Anterior eye row almost straight or slightly procurved as seen from front (Fig. 5A, C), posterior eye row almost straight or slightly recurved as seen from above (Fig. 4B, C). Ocular area about twice as wide as long. Anterior median eyes the smallest, less than half to others (Fig. 5A, C). Clypeus shorter than median ocular area. Chelicerae slightly geniculate in front (Fig. 5B, D). Promargin of fang furrow with 3 teeth, retromargin with 7 to 8 small teeth (denticles). Sternum almost as long as wide, truncate anteriorly, bluntly acuminate posteriorly. Labium quadrate, wider than long. Length of legs: $4>1>2>3$. Legs of male longer than those of female. Tibia I with three pairs of ventral spines (2-2-2-0; proventral spine 1-3 and retroventral spine 1-3) and some prolateral spines; tibia II with retroventral spine 1-3 and some (occasionally none) proventral spines (2-2-1-0 or 1-2-1-0 or 1-1-1-0) and some prolateral spines. Distal ends of tibia I and II without ventral spine. Metatarsus I with proventral spines 1-3 and retroventral spines 1-3 (2-2-2) and some prolateral spines; metatarsus II with proventral spines 1-3, retroventral spines 1-3 and ventral spines (2-2-3) and some prolateral spines.

Male palp. Short and thick in proportion (Fig. 6A). Cymbium relatively short, broad in prolateral side (Fig. 6B-D). Tibia slightly longer than patella. Most of tibia covered with plate-like retrolateral apophysis (Fig. 7). Patella retrolaterally with a unique apophysis (Fig. 6F, G). Apical element of conductor variable (Fig. 6E).

Female genitalia. Epigynum simple, with single or paired inconspicuous atrium (Fig. 3). Stalk of spermatheca variable and frequently indistinct. Base of spermatheca slightly or strongly extended and bent.

Coloration (Fig. 4). Carapace bright yellowish brown to pale yellow, with faint markings or without markings.

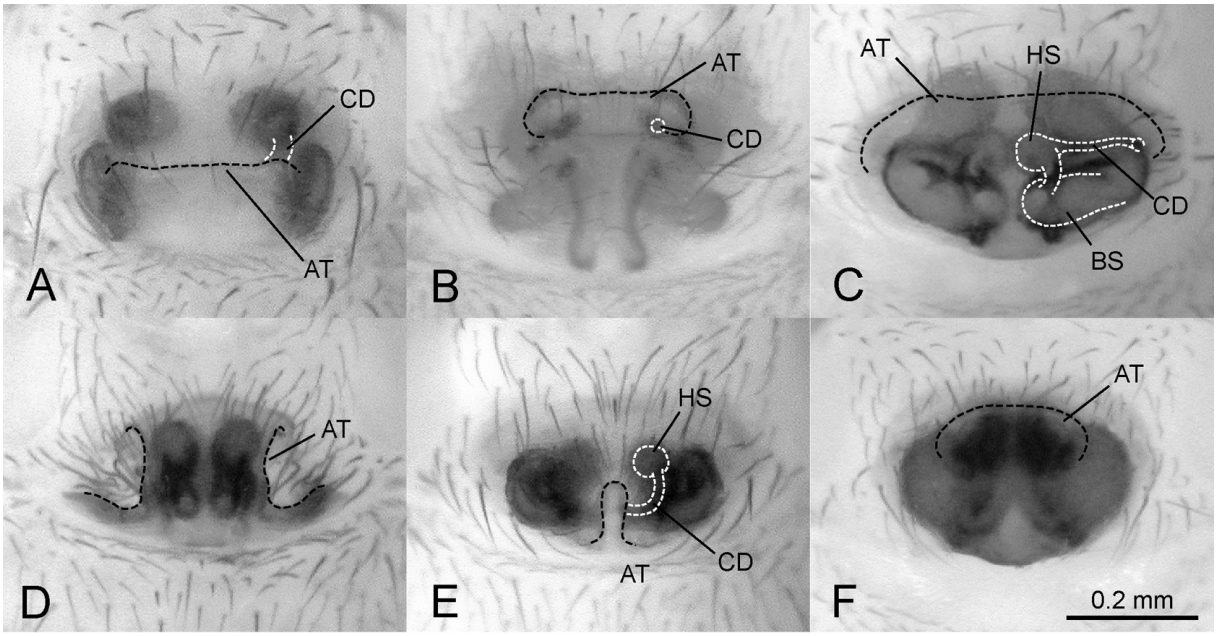

Fig. 3. Diversity of female genitalia of the *hiroshimaensis*-group. — A-F, epigynum, ventral view: A, *C. hiroshimaensis* (Hatsukaichi-shi, Hiroshima Prefecture); B, *C. gonokawa* (Kita-hiroshima-chô, Hiroshima Prefecture); C, *C. tsurusakii* (Shôbara-shi, Hiroshima Prefecture); D, *C. okayamaensis* (Bizen-shi, Okayama Prefecture); E, *C. taraensis* (Kashima-shi, Saga Prefecture); F, *C. biwaensis* (Higashi-ômi-shi, Shiga Prefecture). (AT, epigynal atrium; BS, base of spermatheca; HS, head of spermatheca; CD, copulatory duct.)

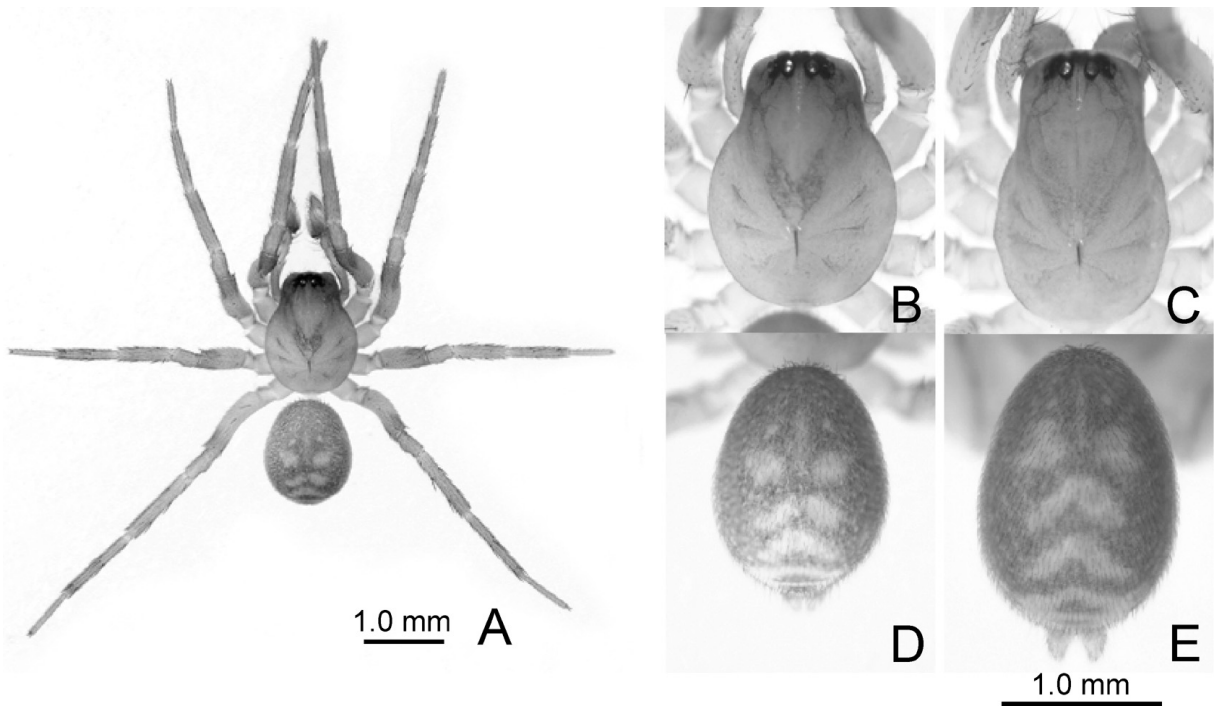

Fig. 4. Shape of carapace and coloration pattern of abdomen of *Cybaeus okumae*, dorsal view. — A, habitus; B-C, carapace; D-E, abdomen. A-B, D, male (holotype); C, E, female (paratype).

Chelicerae, maxillae, labium and sternum dull yellow brown to pale yellow or bright brown to pale yellow; chelicerae darker than the others. Legs bright yellowish brown to pale yellow, usually without annulations. Dorsum of abdomen dark brown to olive brown with pale yellow chevron pattern or pale yellow without markings.

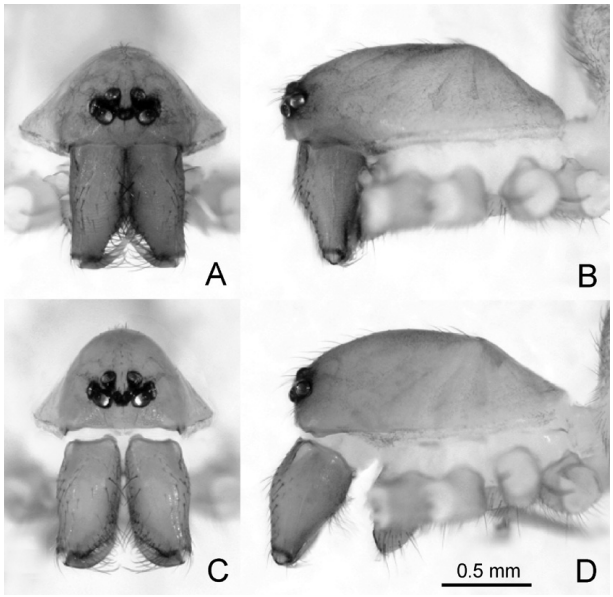

Fig. 5. Shape of carapace and chelicerae of *Cybaeus okumae*. — A, C, anterior view; B, D, lateral view. A-B, male (paratype); C-D, female (paratype).

Descriptions of species

Cybaeus hiroshimaensis Ihara 1993
[Japanese name: Aki-kogata-namihagumo]
(Figs. 3A, 6B, 7A)

Cybaeus hiroshimaensis Ihara 1993, p. 116, figs. 1–7 (male holotype and female paratypes from Mt. Gokurakuji-yama, Hatsukaichi-shi, Hiroshima Prefecture, Honshu, Japan, 3-V-1991, collected by Yoh Ihara.); Ihara 2008, p. 92, fig. 13A, p. 93, fig. 14A.

Description. See Ihara (1993).

Specimens examined. SHIMANE PREF. Hamada-shi, Kanagi-chô, Haza: 720–740 m, 2♀, 25-IX-2004, YI; 760–770 m, 1♀, 23-IX-2006, YI. HIROSHIMA PREF. Hiroshima-shi, Saeki-ku, Yuki-chô: Tada, 480 m, 4♀, YI; Mt. Ômine, 950–1000 m, 2♀, YI & Megumi Ihara. Fukuyama-shi, Yamano-chô, Ryûzu-kyô Gorge, 170–200 m, 1♀, 3-XI-2008, YI. Hatsukaichi-shi, Yoshiwa: Tateiwa, 1♂1♀, 18-XI-1997, YI; the Tateiwa Dam, 1♂1♀, 14-X-2000, YI; Tatsuno Campground, 1♂1♀, 14-X-2000, M. Ihara. Akitakata-shi: Mukaihara-chô, Saka, Yamada, 320 m, 1♂2♀, 25-X-1998, YI; Yachiyo-chô, Haji, 1♂, 6-X-2000, YI. Yamagata-gun, Aki-ôta-chô: Utsunashi, 380 m, 1♂, 14-X-

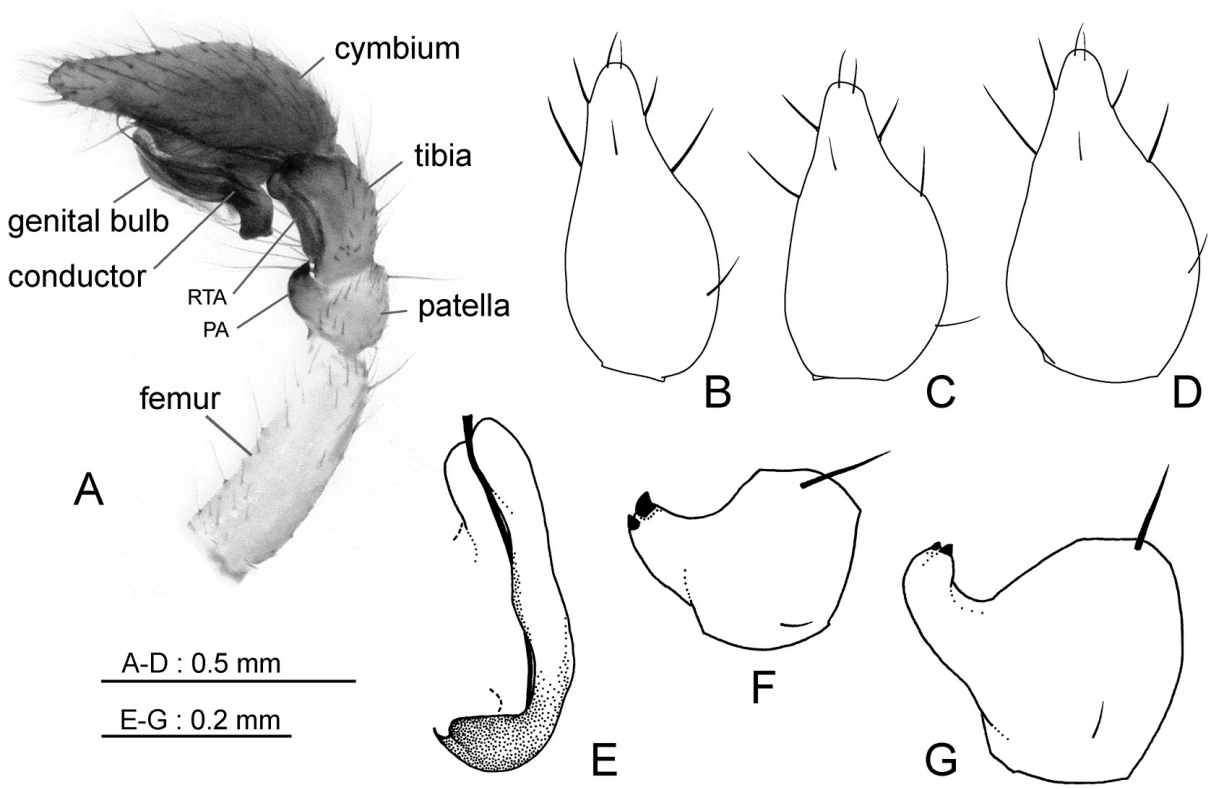

Fig. 6. Male left palp of the *hiroshimaensis*-group. — A, lateral view; B-D, cymbium, dorsal view; E, apical element of conductor, lateral view; F-G, patella, dorsolateral view. B, *C. hiroshimaensis* (Hatsukaichi-shi, Hiroshima Prefecture); C, *C. okayamaensis* (Bizen-shi, Okayama Prefecture); A, F, *C. taraensis* (Kashima-shi, Saga Prefecture); D-E, *C. biwaensis* (Higashi-ômi-shi, Shiga Prefecture). (RTA, retrolateral tibial apophysis; PA, retrolateral patellar apophysis.)

2000, M. Ihara; 1♀, 29-X-2002, YI; Naka-tsutsuga, Ryûzu-kyô Gorge, 1♀, 27-X-2002, YI. Kita-hiroshima-chô: Mt. Tenguishi-yama, 1000 m, 1♀, 15-IX-1993, YI; the foot of Mt. Tenguishi-yama, 1♂, 15-IX-1993, M. Ihara; Hashiyama, 540 m, 1♀, 8-X-2001, YI; Hashiyama, 1♀, 13-IV-2005, YI. YAMAGUCHI PREF. Yamaguchi-shi, Mt. Shôgen-zan, 510 m, 1♀, 26-III-1996, NT. Hagi-shi, Kawakami: eastern slope of Mt. Teijogadake, 330 m, 1♀, 27-III-1996, NT; Mt. Ishizô-yama, Ôdôri Pass, 420 m, 1♀, 27-III-1996, NT; between Yokozaka and Sônose, 1♀, 12-X-2003, YI. Other specimens are listed in Ihara (1993).

Variation. This species includes two geographic forms which are distinguished by retrolateral patellar apophysis of male palp (Ihara 1993). Palps of males of the eastern populations including type locality bear a patellar apophysis with a single apex instead of a bifurcated tip as in western populations.

Range of body size arbitrarily selected in western part of Hiroshima Prefecture (in mm, means ± SD in parentheses; male n=20, female n=20): Carapace length, 1.47-1.72 (1.63 ± 0.071) in male, 1.52-1.82 (1.63 ± 0.073) in female.

Distribution. Western part of Shimane Prefecture, Hiroshima Prefecture and Yamaguchi Prefecture, western Honshu, Japan (Fig. 1).

Cybaeus gonokawa Ihara 1993
[Japanese name: Iwami-kogata-namihagumo]
(Figs. 3B, 7B, 8)

Cybaeus gonokawa Ihara 1993, p. 118, figs. 8–14 (Male holotype and female paratypes from Yachiyo-daki Falls, Funo-chô, Miyoshi-shi, Hiroshima Prefecture, Honshu, Japan, 26-X-1991, collected by Yoh Ihara.); Ihara 2008, p. 92, fig. 13B, p. 93, fig. 14B.

Description. See Ihara (1993).

Specimens examined. SHIMANE PREF. Hamada-shi, Asahi-chô, Tsukawa, Taninaka, 1♂, 24-X-1993, YI. Ôda-shi, Yunotsu-chô, Yataki, 360 m, 3♂2♀, 29-IX-2001, YI. Ôchi-gun: Kawamoto-machi, Tando, 150 m, 1♀, 29-IX-2001, YI; Misato-chô, Ushiomura, 200 m, 1♀, 29-IX-2001, YI; Onan-cho, Kami-kuchiba, 1♂, 26-IX-1993, YI. HIROSHIMA PREF. Yamagata-gun, Kita-hiroshima-chô: Nishi-yawatahara, 790 m, 1♂, 7-X-2001, YI; Hashiyama, 1♀, 12-IV-2005, YI; 5♀, 13-IV-2005, YI. Other specimens are listed in Ihara (1993).

Variation. Retrolateral patellar apophysis of male palp varies among populations (Ihara 1993). Furthermore, this species includes two geographic forms distinguished by details of female genitalia from one another. One form (Fig. 8A) occurs in populations occupying the most part of the species distributional range including type locality (Fig. 9,

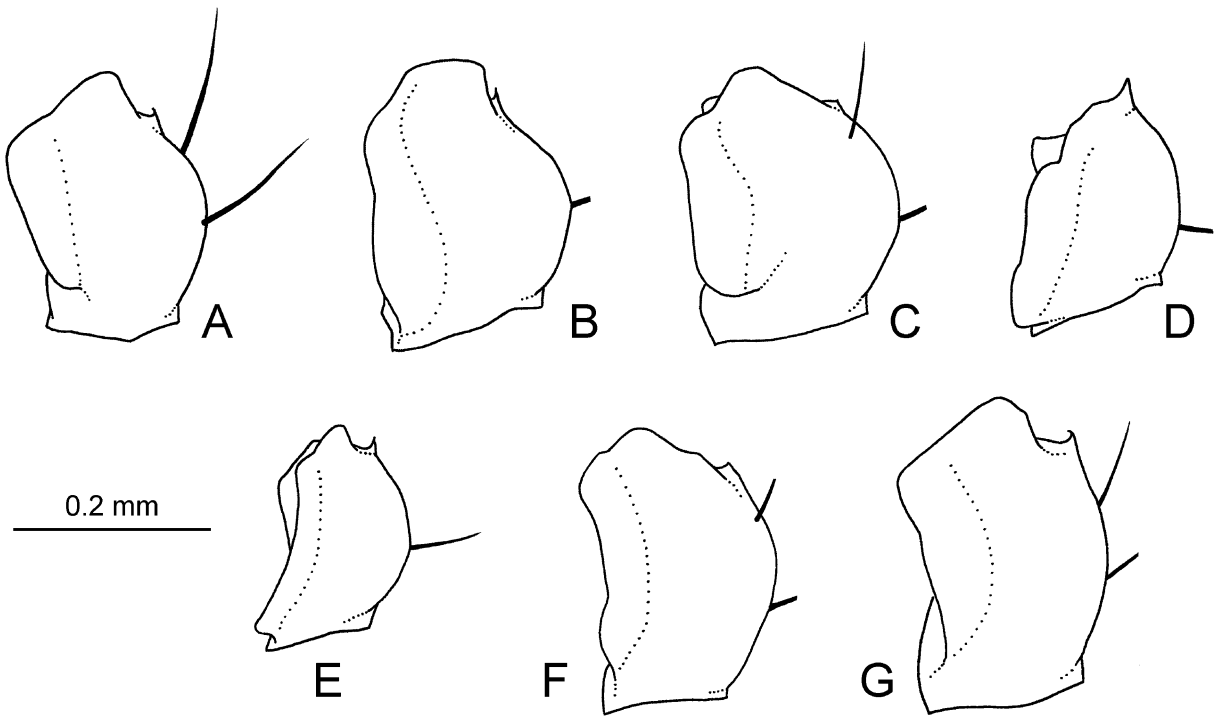

Fig. 7. Diversity of male palp of the *hiroshimaensis*-group. — A-G, Retrolateral tibial apophysis of left palp, lateral view: A, *C. hiroshimaensis* (Hatsukaichi-shi, Hiroshima Prefecture); B, *C. gonokawa* (Kita-hiroshima-chô, Hiroshima Prefecture); C, *C. tsurusakii* (Shobara-shi, Hiroshima Prefecture); D, *C. nojimai* (Shisô-shi, Hyogo Prefecture); E, *C. okayamaensis* (Misaki-chô, Okayama Prefecture); F, *C. taraensis* (Kashima-shi, Saga Prefecture); G, *C. biwaensis* (Higashi-ômi-shi, Shiga Prefecture).

solid circles). Another form (Fig. 8B) has been found only along the down stream area of the Gonokawa River (Fig. 9, double circles).

Range of body size based on the specimens selected from the eastern populations in Shimane Prefecture (in mm, means in parentheses; male n＝5, female n＝9): Carapace length, 1.32-1.75 (1.60) in male, 1.46-1.68 (1.56) in female; carapace width, 0.96-1.20 (1.12) in male, 1.01-1.12 (1.05) in female; length of tibia I, 1.01-1.17 (1.09) in male, 0.81-0.96 (0.86) in female.

Distribution. Shimane Prefecture and northwestern part of Hiroshima Prefecture, western Honshu, Japan (Fig. 1). This species was sympatrically found with *C. hiroshimaensis* in Kita-hiroshima-chô, northwestern part of Hiroshima Prefecture.

Cybaeus tsurusakii Ihara 1993
[Japanese name: Izumo-kogata-namihagumo]
(Figs. 3C, 7C)

Cybaeus tsurusakii Ihara 1993, p. 121, figs. 15–18 (male holotype and female paratype from Mt. Ôyorogi, Iinan-chô, Iishi-gun, Shimane Prefecture, Honshu, Japan, 18-X-1992, collected by Yoh Ihara.); Ihara 2008, p. 92, fig. 13C, p. 93, fig. 14C.

Description. See Ihara (1993).

Specimens examined. TOTTORI PREF. Saihaku-gun, Daisen-chô, Mt. Daisen, Sannosawa, 1100 m: 1♀, 9-X-1994, KN; 1♂2♀, 9-X-1994, YI. SHIMANE PREF. Unnan-shi, Yoshida-chô, eastern side of Mt. Kenashi, 1000–1050 m, 1♂, 7-IX-1998, YI. Nita-gun, Okuizumo-chô, Mt. Sentsû: 740–840 m, 3♂1♀, 24-IX-2007, YI; 1120 m, 2♂, 24-IX-2007, YI. Iishi-gun, Iinan-chô, Mt. Ôyorogi, 1200 m, 1♂, 13-IX-1998, M. Ihara. OKAYAMA PREF. Takahashi-shi, Bicchu-chô, Nishiyama, 1♂1♀, 19-X-2003, YI. HIROSHIMA PREF. Shôbara-shi, Mizukoshi-chô, Ôta: 3♂7♀, 10-XI-1993, YI; 2♀, 9-IV-1994, YI. Saijô-chô: Mt. Tate-eboshi, 1♀, 6-XI-1993, YI; Rokunohara, 850 m, 1♂, 6-XI-1993, YI; Mt. Hiba-yama, Goryô, 1200 m, 1♀, 6-XI-1993, KN. Hiwa-chô, Mt. Hiba-yama, Opparagoe, 1100 m, 3♀, 6-XI-1993, YI. Takano-chô: southern foot of Mt. Sarumasa, 750–800 m, 1♀, 8-X-1997, YI; Wananbara, Okumizawa, 650–660 m, 1♀, 8-X-1997, YI; Okumizawa, 670–680 m, 1♀, 22-V-1998, YI; Kôbo, Sunagahara, 2♂, 17-X-2006, YI. Other specimens are listed in Ihara (1993).

Variation. No prominent variation was found in the morphology among populations.

Range of body size base on the specimens selected in Shimane Prefecture (in mm, means ± SD in parentheses; male n＝7, female n＝20): Carapace length, 1.48-1.73 (1.64) in male, 1.27-1.78 (1.61 ± 0.128) in female; carapace width, 1.14-1.28 (1.23) in male, 0.88-1.22 (1.11 ± 0.085) in female; length of tibia I, 0.95-1.14 (1.06) in male, 0.72-1.07 (0.93 ± 0.087) in female.

Distribution. Western part of Tottori Prefecture, eastern part of Shimane Prefecture, northwestern part of Okayama Prefecture and northeastern part of Hiroshima Prefecture, western Honshu, Japan (Fig. 1). This species was sympatrically found with *C. nojimai* in Mt. Daisen, western part of Tottori Prefecture.

Cybaeus nojimai Ihara 1993
[Japanese name: Nojima-kogata-namihagumo]
(Figs. 7D, 10, 18B, D)

Cybaeus nojimai Ihara 1993, p. 123, figs. 19–22 (male holotype and female paratypes from Mt. Yamanori-yama, Maniwa-shi, Okayama Prefecture, Honshu, Japan, 29-X-1990, collected by Koichi Nojima.); Ihara 2008, p. 92, fig. 13D, p. 93, fig. 14D.

Description. See Ihara (1993).

Specimens examined. HYOGO PREF. Toyo-oka-shi:

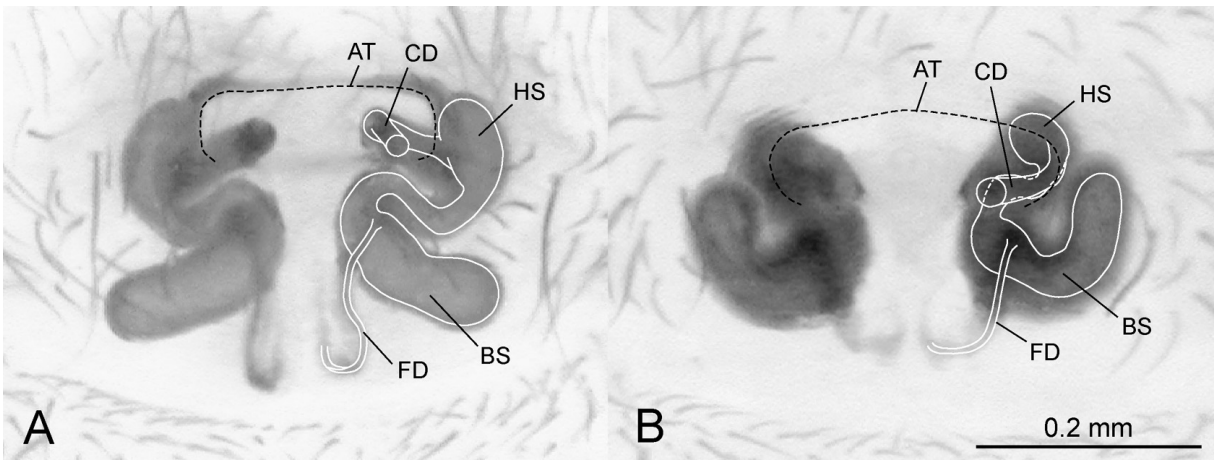

Fig. 8. Geographic variation of female genitalia of *Cybaeus gonokawa*, ventral view. — A, Kita-hiroshima-chô, Hiroshima Prefecture; B, Misato-chô Shimane Prefecture. (AT, epigynal atrium; BS, base of spermatheca; HS, head of spermatheca; CD, copulatory duct; FD, fertilization duct.)

Shounji, 19-V-1995, 4♀, KN; Akaishi, 9-X-2008, 2♀, KN. Shisô-shi, Yamasaki-chô: Shimomakidani, 5♂5♀, 3-XI-2005, KN; Kamino, 2♂3♀, 3-XI-2005, KN. Ichinomiya-chô: Kawaharada, Takano, Fudô-daki Falls, 430–460 m, 1♂, 12-XI-2006, YI; Kumon, 380–400 m, 3♂3♀, 12-XI-2006, YI; Sencho, 620 m, 1♂, 12-XI-2006, YI. Sayô-gun, Sayô-chô, Kami-hongô, Kamakura, Iwayayama-keikoku, 230 m, 1♂, 3-XI-2005, YI. TOTTORI PREF. Tottori-shi: Mikuma, Mikuma Shrine, 120 m, 1♂3♀, 6-I-1994, NT; Shikano-chô, Kochi, 290 m, 1♀, 6-I-1994, NT. Saihaku-gun, Daisen-chô, Mt. Daisen: Ninosawa, 980 m, 5♀, 16-IV-1994, NT; northern entrance of Yokotemichi, 820 m, 1♂1♀, 16-IV-1994, NT; Sannosawa, 1000–1100 m, 3♀, 9-X-1994, KN; Sannosawa, 1000–1100 m, 1♂1♀, 9-X-1994, YI. OKAYAMA PREF. Maniwa-shi, Kashinishi, Ashio-daki Falls, 380 m, 1♂, 11-X-2004, YI. Other specimens are listed in Ihara (1993).

Variation. Females in Toyo-oka population (Fig. 1) have large colored area of epigynal plate compared with those from others including type locality. In addition, spermatheca of female genitalia in Toyo-oka population (Fig. 10B) looks more robust than others (Fig. 10A). Male of Toyo-oka population is unknown.

Range of body size based on the specimens selected from Shisô-shi, Hyogo Prefecture (in mm, means in parentheses; male n＝13, female n＝11): Carapace length, 1.37-1.59 (1.49) in male, 1.25-1.52 (1.42) in female; carapace width, 0.98-1.18 (1.10) in male, 0.88-1.05 (0.96) in female; length of tibia I, 0.77-0.89 (0.84) in male, 0.66-0.81 (0.74) in female.

Distribution. Western and northern part of Hyogo Prefecture, Tottori Prefecture and northeastern part of Okayama Prefecture, western Honshu, Japan (Fig. 1). This species was sympatrically found with *C. tsurusakii* in westernmost part of its distributional range.

Cybaeus okayamaensis Ihara 1993
[Japanese name: Kibi-kogata-namihagumo]
(Figs. 3D, 6C, 7E)

Cybaeus okayamaensis Ihara 1993, p. 125, figs. 23–26 (male holotype, 18-X-1992, and female paratypes, 28-III-1993, from Kose, Misaki-chô, Kume-gun, Okayama Prefecture, Honshu, Japan, collected by Koichi Nojima.); Ihara 2008, p. 92, fig. 13E, p. 93, fig. 14E.

Description. See Ihara (1993).

Specimens examined. OKAYAMA PREF. Bizen-shi, Yoshinaga-chô, Tama, 1♀, 30-XII-2006, KN. Kume-gun, Misaki-chô, Eyomi, 1♂1♀, 31-XII-2006, KN. Other specimens are listed in Ihara (1993).

Variation. No prominent variation was found in the morphology among the populations, probably due partly to its narrow range of distribution.

Range of body size (in mm, male n＝2, female n＝4): Carapace length, 1.45-1.60 in male, 1.30-1.42 in female; carapace width, 1.04-1.12 in male, 0.90-0.96 in female; length of tibia I, 0.83-0.92 in male, 0.70-0.78 in female.

Distribution. Southeastern part of Okayama Prefecture, western Honshu, Japan (Fig. 1).

Cybaeus taraensis Irie & Ono 2001
[Japanese name: Tara-kogata-namihagumo]
(Figs. 3E, 6A, F, 7F)

Cybaeus taraensis Irie & Ono 2001, p. 34, figs. 21–25 (male holotype, NSMT-Ar 4783, 27-IX-2000, and female paratype, NSMT-Ar 4784, 26-XI-2000, from Mt. Tara-dake, Takaki-chô, Isahaya-shi, Nagasaki Prefecture, Kyushu, Japan, collected by Teruo Irie. Not examined.); Ihara 2008, p. 92, fig. 13F, p. 93, fig. 14F.

Description. See Irie & Ono (2001).

Specimens examined. SAGA PREF. Kashima-shi, Yamaura, Okuhiradani Campground, 470 m: 3♂4♀, 13-XI-2005, YI; 1♀, 13-XI-2005, M. Ihara. Fujitsu-gun, Tara-chô, Mt. Tara-dake, Nakayama Campground, 550 m, 1♀, 7-XI-1998, YI.

Variation. Since the species is known only from the two localities closely located, the information was not acquired for geographic variation.

Range of body size (in mm, means in parentheses; male n＝3, female n＝6): Carapace length, 1.39-1.45 in male, 1.37-1.54 (1.45) in female; carapace width, 1.03-1.04 in male, 0.96-1.04 (0.99) in female; length of tibia I, 0.83-0.85 in male, 0.72-0.83 (0.77) in female.

Distribution. Known only from Mt. Taradake and its vicinities, Saga Prefecture (Fig. 1) and Nagasaki Prefecture (Irie & Ono 2001), northwestern Kyushu, Japan.

Cybaeus biwaensis Kobayashi 2006
[Japanese name: Biwa-kogata-namihagumo]
(Figs. 3F, 6D-E, 7G)

Cybaeus biwaensis Kobayashi 2006, p. 34, figs. 21–25 (male holotype from Ôtaki, Tarui-chô, Fuwa-gun, Gifu Prefecture, Honshu, Japan, 7-II-1998, collected by Hisatoshi Kobayashi. Female paratype from Oku, Kami-ishizu-chô, Ôgaki-shi, Gifu Prefecture, Honshu, Japan, 8-I-2000, collected by H. Kobayashi. Not examined.); Ihara 2008, p. 92, fig. 13G, p. 93, fig. 14G.

Description. See Kobayashi (2006).

Specimens examined. GIFU PREF. Fuwa-gun, Sekigahara-chô, Sekigahara, 600 m, 2♀, 29-I-2004, KN. MIE PREF. Inabe-shi: Fujiwara-chô, Yamaguchi, 1♀, 24-X-2006, KN; Hokusei-chô, Shinmachi, Aogawa-kyô, 190–200 m, 1♂4♀, 26-X-2008, KN, 2♂1♀, 26-X-2008, YI. SIGA PREF. Higashi-ômi-shi: Kiwada-chô, 400–410 m, 3♂4♀, 9-X-2005, YI; Hyakusaijikô-chô, 1♀, 27-XI-2005, KN. Maibara-shi, Yoshitsuki, 9-X-2005, YI. Inukami-gun, Taga-chô, Kawachi, 260–270 m, 4♂1♀, 9-X-2005, YI. KYOTO

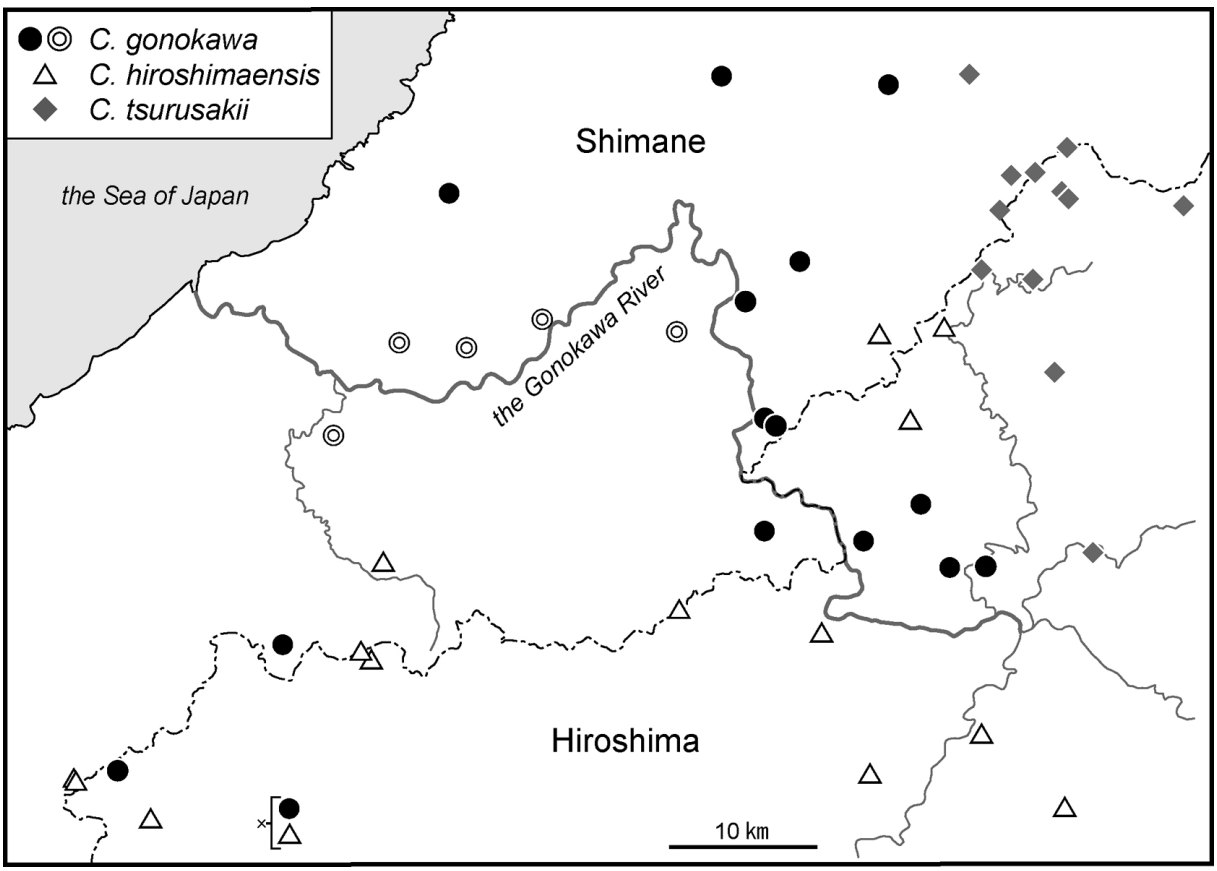

Fig. 9. Geographic variation of *Cybaeus gonokawa* and distributions of related species in the Gonokawa Basin.

PREF. Kyoto-shi, Ukyô-ku: Keihokuoshio-chô, 2♂1♀, 22-X-2005, KN; Sagakoshihata-momohara, 3♂3♀, 22-X-2005, KN. Nantan-shi, Miyama-chô, Hara, Hara-tôge, 1♀, 5-VI-1991, YI. Funai-gun, Kyotanba-chô, Ômisu, 1♀, 7-III-1991, YI.

Variation. No prominent variation was found in the morphology among populations.

Range of body size (in mm, means ± SD in parentheses; male n=12, female n=15): Carapace length, 1.26-1.62 (1.50 ± 0.120) in male, 1.33-1.60 (1.47 ± 0.099) in female; carapace width, 0.92-1.25 (1.13 ± 0.102) in male, 0.90-1.14 (1.02 ± 0.072) in female; length of tibia I, 0.69-0.96 (0.87 ± 0.086) in male, 0.70-0.92 (0.79 ± 0.061) in female.

Distribution. Southwestern part of Gifu Prefecture, northern part of Mie Prefecture, Shiga Prefecture, Kyoto Prefecture (Fig. 1) and Fukui Prefecture (Kobayashi 2006), central Honshu, Japan.

***Cybaeus okumae* n. sp.**

[Japanese name: Hikosan-kogata-namihagumo]
(Figs. 4, 5, 11, 12)

Cybaeus sp. Hikosan, Ihara 2008, p. 92, fig. 13H, p. 93, fig. 14H (Miyako-machi, Miyako-gun, Fukuoka Prefecture).

Diagnosis. Patellar apophysis of male palp and large spermathecal base of female are unique within the group.

Description. Male (holotype)

Measurements (in mm). Body length 3.00; carapace length 1.59, width 1.18, head region width 0.74; abdomen length 1.52, width 1.12; sternum length 0.77, width 0.76. Length of legs (femur/ patella/ tibia/ metatarsus/ tarsus; total): Leg I: 1.22/ 0.44/ 1.00/ 0.90/ 0.59: 4.15. Leg II: 1.16/ 0.44/ 0.89/ 0.85/ 0.56; 3.90. Leg III: 0.99/ 0.41/ 0.67/ 0.79/ 0.48; 3.34. Leg IV: 1.20/ 0.40/ 0.99/ 1.09/ 0.60; 4.28. Ocular area: length 0.22, width 0.43.

Anterior eye row slightly procurved as seen from front (Fig. 5A), posterior eye row almost straight as seen from above (Fig. 4B). Tibia I with 2-2-2-0 ventral spines and 2 prolateral spines; metatarsus I with 2-2-2 ventral spines and 1 prolateral spine; tibia II with 2-2-1(retromargin)-0 ventral spines and 2 prolateral spines; metatarsus II with 2-2-3 ventral spines and 1 prolateral spine. Promarginal ventral spines of tibia II small.

Palp (Fig. 11). Tibia relatively short, as long as patella. Patellar apophysis relatively wide, with 6 conical teeth. Conductor simple.

Coloration (Fig. 4). Head region bright yellowish brown and thoracic region light yellow, with olive black markings. Chelicerae dull yellowish brown, maxillae and labium dull yellow orange, and sternum pale yellow. Legs light yellow,

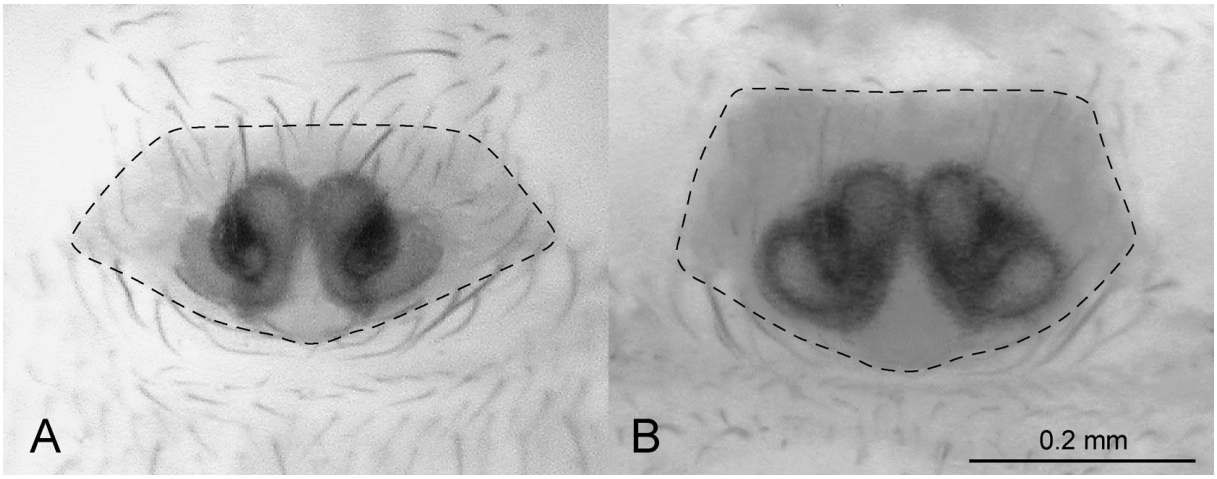

Fig. 10. Geographic variation in female genitalia of *Cybaeus nojimai*. — A-B, epigynum, ventral view: A, Shisô-shi, Hyogo Prefecture; B, Toyo-oka-shi, Hyogo Prefecture. (Dashed line: colored area in epigynal plate.)

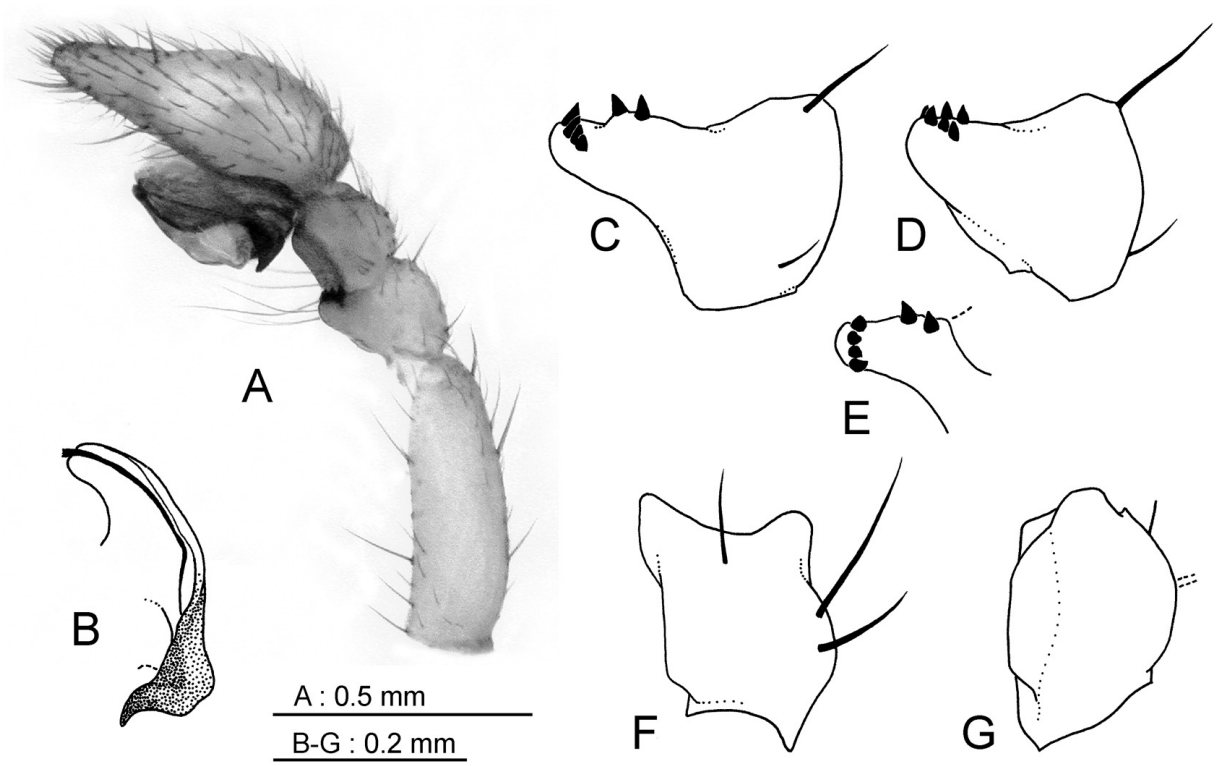

Fig. 11. Male left palp of *Cybaeus okumae* n. sp. (holotype). — A, lateral view; B, apical element of conductor, ventrolateral view; C-D, patella, dorsolateral (B) and lateral (C) views; E, retrolateral apophysis of patella, anterior view; F-G, tibia, dorsal (F) and lateral (G) views.

without annulations. Dorsum of abdomen dark olive with pale yellow chevron pattern.

Female (one of paratypes). Measurements (in mm). Body length; 3.25; carapace length 1.68, width 1.10, head region width 0.79; abdomen length 1.78, width 1.33; sternum length 0.79, width 0.78. Length of legs (femur/ patella/ tibia/ metatarsus/ tarsus; total): Leg I: 1.18/ 0.48/ 0.91/ 0.80/ 0.51; 3.88. Leg II: 1.02/ 0.46/ 0.81/ 0.77/ 0.48; 3.54. Leg III: 0.93/ 0.41/ 0.59/ 0.70/ 0.42; 3.05. Leg IV: 1.12/ 0.41/ 0.93/ 1.02/ 0.55; 4.03. Ocular area: length 0.22, width 0.45. Tibia I with 2-2-2-0 ventral spines and 3 prolateral spines; metatarsus I with 2-2-2 ventral spines and 1 prolateral spine; tibia II with 2-2-1(retromargin)-0 ventral spines and 2 prolateral spines; metatarsus II with 2-2-3 ventral spines and 2 prolateral spines. Promarginal ventral spines of tibia II small.

Genitalia (Fig. 12). Epigynum with a paired inconspicuous atriums. Copulatory duct sinuate. Spermathecal base large and spheroid.

Type series. Holotype (♂, NSMT-Ar 8493) and

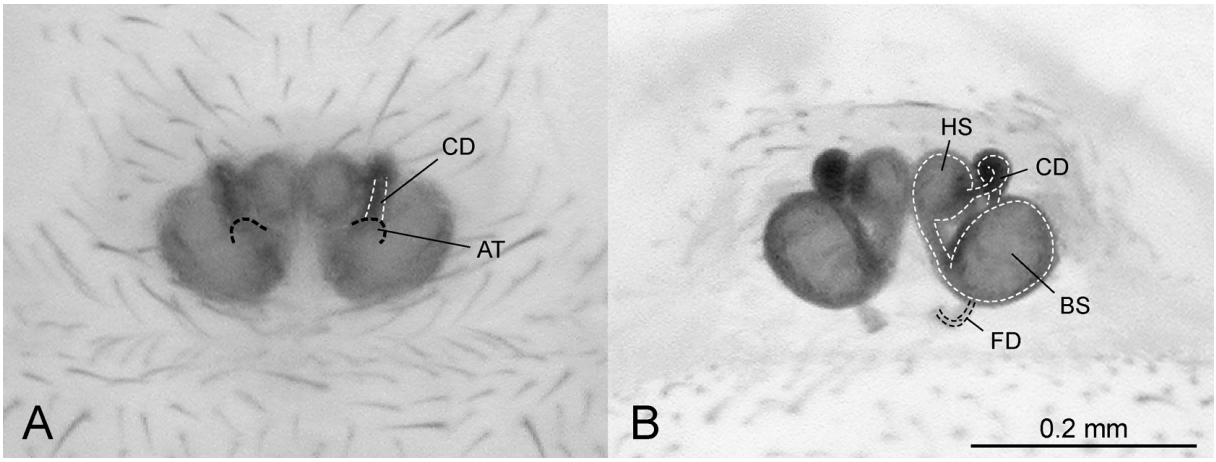

Fig. 12. Female genitalia of *Cybaeus okumae* n. sp. (paratype). — A, epigynum, ventral view; B, internal structure, dorsal view. (AT, epigynal atrium; BS, base of spermatheca; HS, head of spermatheca; CD, copulatory duct; FD, fertilization duct.)

paratypes (1♂2♀, NSMT-Ar 8494-8496): Jabuchi campground, Hobashira, Miyako-machi, Miyako-gun, Fukuoka Pref., Japan, 470–490 m alt., 15-X-2006, Yoh Ihara leg.

Other specimens examined. FUKUOKA PREF. Buzen-shi, Kubote, 4♀, 19-XI-1994, YI. Tagawa-gun, Soeda-machi, Mt. Hikosan, 850 m, 1♀, 9-X-1995, YI. Miyako-gun, Miyako-machi: Same locality as holotype, 13♀, 19-XI-2005, YI; 12♂5♀, 15-X-2006, YI; Notoge, 750 m, 1♀, 19-XI-2005, YI. SAGA PREF. Saga-shi, Fuji-chô, Kami-kumakawa, Onbuchi-menbuchi Park, 9♀, 5-III-1999, YI.

Variation. No prominent variation was found in the morphology among populations.

Range of body size (in mm, means ± SD in parentheses; male n=13, female n=19): Carapace length, 1.40-1.64 (1.52 ± 0.082) in male, 1.20-1.68 (1.50 ± 0.126) in female; carapace width, 1.02-1.20 (1.12 ± 0.066) in male, 0.80-1.10 (1.01 ± 0.085) in female; length of tibia I, 0.88-1.03 (0.95 ± 0.058) in male, 0.63-0.91 (0.81 ± 0.076) in female.

Distribution. Fukuoka Prefecture and eastern part of Saga Prefecture, northern Kyushu, Japan (Fig. 1).

Remarks. I was offered many specimens and illustrations of the genus *Cybaeus* from the late Prof. Takeo Yaginuma in 1994. I found an interesting small-sized *Cybaeus* spider among his illustrations. This species can be easily distinguished by its genital morphology, especially by the unique retrolateral patellar apophysis of male palp and large spermathecal base of female genitalia. The original specimens were collected from Mt. Hikosan, northern Kyushu in 1959 (male) and 1962 (female) by the late Dr. Chiyoko Okuma. Unfortunately, original specimens of the illustrations seemed to be lost since they had not been included in the specimens offered by Prof. Yaginuma. I have obtained several female specimens that match those illustrations from northern part of Kyushu. Furthermore, I finally collected also males from southern part of Fukuoka Prefecture near Mt. Hikosan in 2006, nearly 50 years after the Okuma's first collecting.

***Cybaeus sasayamaensis* n. sp.**

[Japanese name: Sasayama-kogata-namihagumo]
(Figs. 13, 14)

Cybaeus sp. Sasayama, Ihara 2008, p. 92, fig. 13I, p. 93, fig. 14I (Sasayama-shi, Hyogo Prefecture).

Diagnosis. Distinguishable by detail of male palp and female genitalia from other species within the group. In male, short patellar apophysis with large conical teeth is unique.

Description. Male (holotype). Measurements (in mm). Body length 2.60; carapace length 1.45, width 1.04, head region width 0.64; abdomen length 1.38, width 1.03; sternum length 0.67, width 0.68. Length of legs (femur/ patella/ tibia/ metatarsus/ tarsus; total): Leg I: 0.99/ 0.42/ 0.81/ 0.70/ 0.51; 3.43. Leg II: 0.91/ 0.40/ 0.70/ 0.66/ 0.44; 3.11. Leg III: 0.78/ 0.37/ 0.54/ 0.63/ 0.42; 2.74. Leg IV: 0.98/ 0.39/ 0.83/ 0.88/ 0.50; 3.58. Ocular area: length 0.20, width 0.37.

Anterior eye row procurved as seen from front, posterior eye row almost straight as seen from above. Tibia I with 2-2-2-0 ventral spines and 2 prolateral spines; metatarsus I with 2-2-2 ventral spines and 1 prolateral spine; tibia II with 1-1-1-0 ventral spines (retromargin) and 2 prolateral spines; metatarsus II with 2-2-3 ventral spines and 2 prolateral spines. Ventral spines of tibia II only promaginal side.

Palp (Fig. 13). Tibia relatively long. Patellar apophysis short, with 3 large conical teeth. Apical element of conductor thick and coiled.

Coloration. Head region bright yellowish brown and thoracic region pale yellow, with faint markings. Chelicerae bright brown, maxillae and labium orange, and sternum pale yellow. Legs bright yellowish brown, without annulations. Dorsum of abdomen dark olive brown with obscure pale yellow chevron pattern.

Female (one of paratypes). Measurements (in mm). Body length; 2.90; carapace length 1.52, width 1.00, head region width 0.70; abdomen length 1.44, width 1.10;

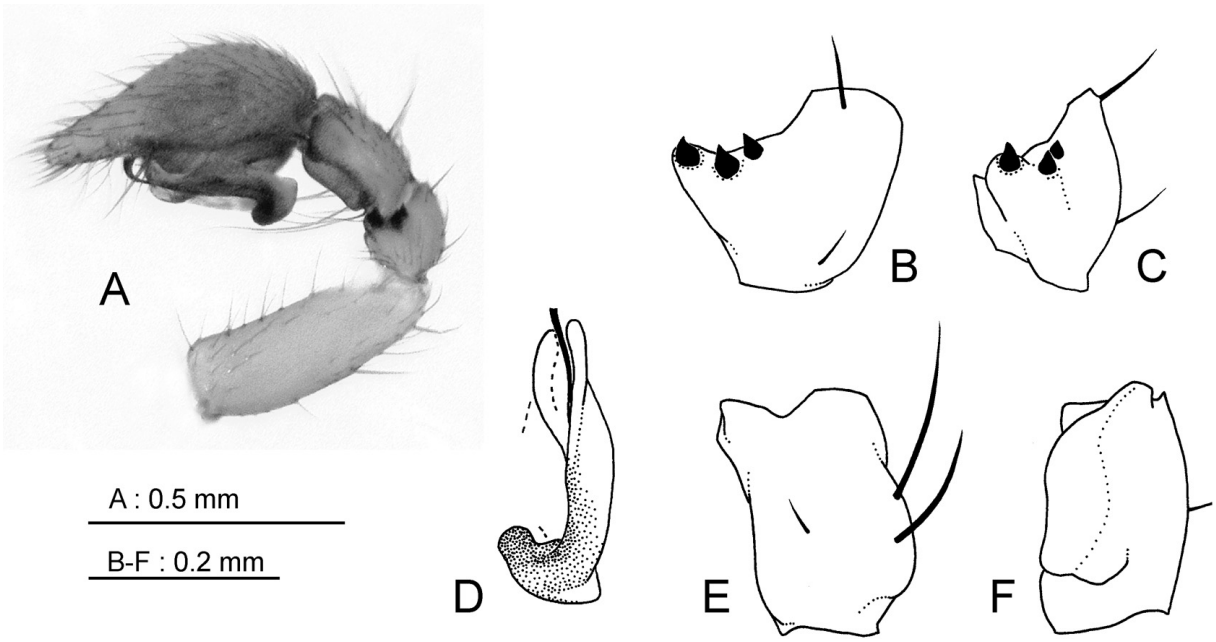

Fig. 13. Male left palp of *Cybaeus sasayamaensis* n. sp. (holotype). — A, lateral view; B-C, patella, dorsolateral (B) and lateral (C) views; D, apical element of conductor, lateral view; E-F, tibia, dorsal (E) and lateral (F) views.

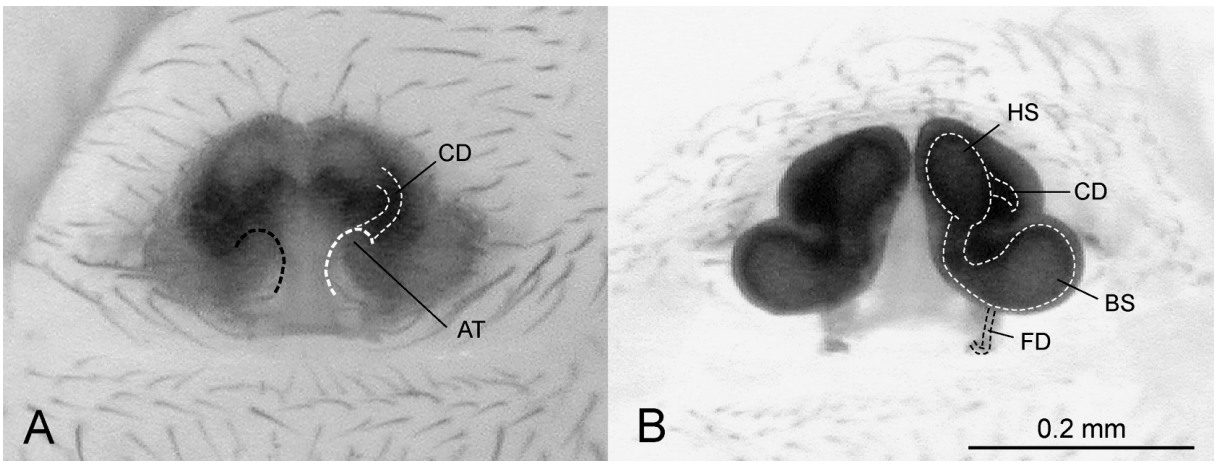

Fig. 14. Female genitalia of *Cybaeus sasayamaensis* n. sp. (paratype). — A, epigynum, ventral view; B, internal structure, dorsal view. (AT, epigynal atrium; BS, base of spermatheca; HS, head of spermatheca; CD, copulatory duct; FD, fertilization duct.)

sternum length 0.71, width 0.70. Length of legs (femur/ patella/ tibia/ metatarsus/ tarsus; total): Leg I: 0.98/ 0.44/ 0.79/ 0.68/ 0.44; 3.33. Leg II: 0.92/ 0.42/ 0.68/ 0.63/ 0.43; 3.08. Leg III: 0.78/ 0.37/ 0.50/ 0.60/ 0.36; 2.61. Leg IV: 0.98/ 0.39/ 0.80/ 0.86/ 0.46; 3.49.

Tibia I with 2-2-2-0 ventral spines and 2 prolateral spines; metatarsus I with 2-2-2 ventral spines and 1 prolateral spine; tibia II with 1-1-1-0 ventral spines (retromargin) and 2 prolateral spines; metatarsus II with 2-2-3 ventral spines and 2 prolateral spines. Ocular area: length 0.19, width 0.42.

Genitalia (Fig. 14). Epigynum with a paired atriums. Copulatory duct curved outside. Spermathecal base slightly long and bent.

Type series. Holotype (♂, NSMT-Ar 8497) and paratypes (2♂2♀, NSMT-Ar 8498-8501): Kuroishi, Konda-chô, Sasayama-shi, Hyogo Pref., Japan, 17-X-2005, Koichi Nojima leg.

Other specimens examined. OSAKA PREF. Takatsuki-shi, Niryô, 1♂7♀, 22-X-2005, KN. HYOGO PREF. Takarazuka-shi, Tamase, 1♀, 26-IX-2004, Aki Nagai. Sasayama-shi, Kami-sasami, 1♂2♀, 1-IV-2006, KN. Tanba-shi, Yamanami-chô: Iwaya, 2♀, 11-X-2006, KN; Onojiri, 3♂4♀, 11-X-2006, KN.

Variation. No prominent variation was found in the morphology among populations, probably due partly to its narrow range of distribution.

Range of body size (in mm, means ± SD in parentheses;

male n＝8, female n＝18): Carapace length, 1.44-1.58 (1.48) in male, 1.31-1.54 (1.44 ± 0.075) in female; carapace width, 1.02-1.14 (1.07) in male, 0.88-1.06 (0.97 ± 0.053) in female; length of tibia I, 0.79-0.94 (0.84) in male, 0.66-0.84 (0.76 ± 0.055) in female.

Distribution. Western part of Osaka Prefecture and eastern part of Hyogo Prefecture, Honshu, Japan (Fig. 1).

Remarks. C. sasayamaensis is also treated under the *hiroshimaensis*-group because of its small-sized body, genital morphology and distributional pattern, although the retreat type of this species has not been known yet.

Male palp of *Cybaeus sasayamaensis* resembles that of *C. nojimai* in proportion. However, this species can be distinguished from *C. nojimai* by having conical shape of retrolateral patellar apophysis against plate-like shape of *C. nojimai*.

***Cybaeus nagaiae* n. sp.**

[Japanese name: Tango-kogata-namihagumo]
(Figs. 15, 16)

Cybaeus sp. Tango, Ihara 2008, p. 92, fig. 13J, p. 93, fig. 14J (Kyôtango-shi, Kyoto Prefecture).

Diagnosis. Curved patellar apophysis of male palp and large spermathecal head of female are unique within the group.

Description. Male (holotype). Measurements (in mm). Body length 3.15; carapace length 1.72, width 1.27, head region width 0.75; abdomen length 1.45, width 0.95; sternum length 0.77, width 0.80. Length of legs (femur/ patella/ tibia/ metatarsus/ tarsus; total): Leg I: 1.20/ 0.50/ 1.04/ 0.91/ 0.65; 4.30. Leg II: 1.12/ 0.49/ 0.88/ 0.88/ 0.59; 3.96. Leg III: 0.97/ 0.44/ 0.69/ 0.85/ 0.52; 3.47. Leg IV: 1.18/ 0.47/ 1.02/ 1.13/ 0.64; 4.44. Ocular area: length 0.20, width 0.43.

Anterior eye row slightly procurved as seen from front, posterior eye row slightly recurved as seen from above. Tibia I with 2-2-2-0 ventral spines and 2 (left) or 1 (right) prolateral spines; metatarsus I with 2-2-2 ventral spines and 1 prolateral spine; tibia II with 1 (retromargin) -2-1 (retromargin) -0 ventral spines and 2 prolateral spines; metatarsus II with 2-2-3 ventral spines and 2 prolateral spines. Promarginal ventral spine of tibia II small.

Palp (Fig. 15). Tibia relatively short and proximally bent for prolateral side. Patella longer than tibia. Retrolateral patellar apophysis long and curve to upper. Conductor with a large apical element of conductor.

Coloration. Head region bright yellowish brown and thoracic region pale yellow, without markings. Chelicerae, maxillae and labium bright yellowish brown, sternum pale yellow. Legs pale yellow, without annulations. Dorsum of abdomen brownish black with pale yellow chevron pattern.

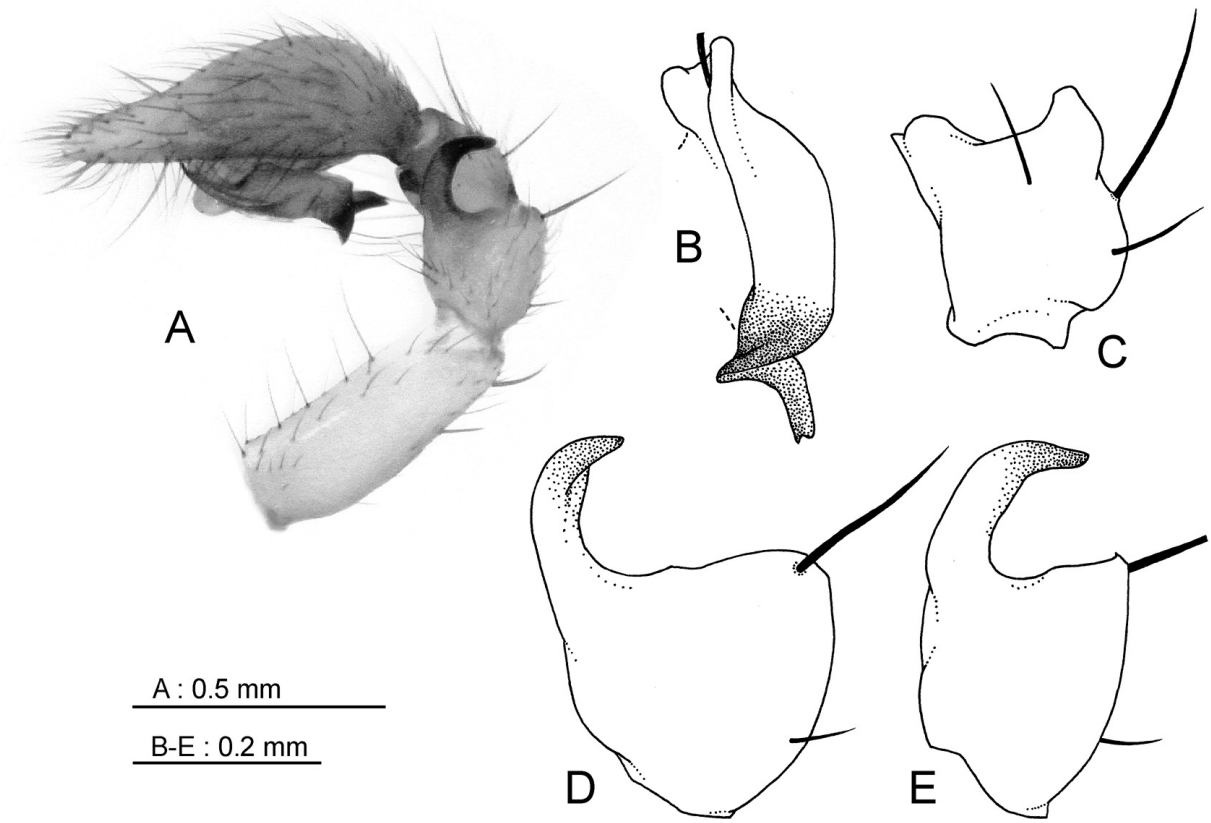

Fig. 15. Male left palp of *Cybaeus nagaiae* n. sp. (holotype). — A, lateral view; B, apical element of conductor, lateral view; C, tibia, dorsal view D-E, patella, dorsolateral (B) and lateral (C) views.

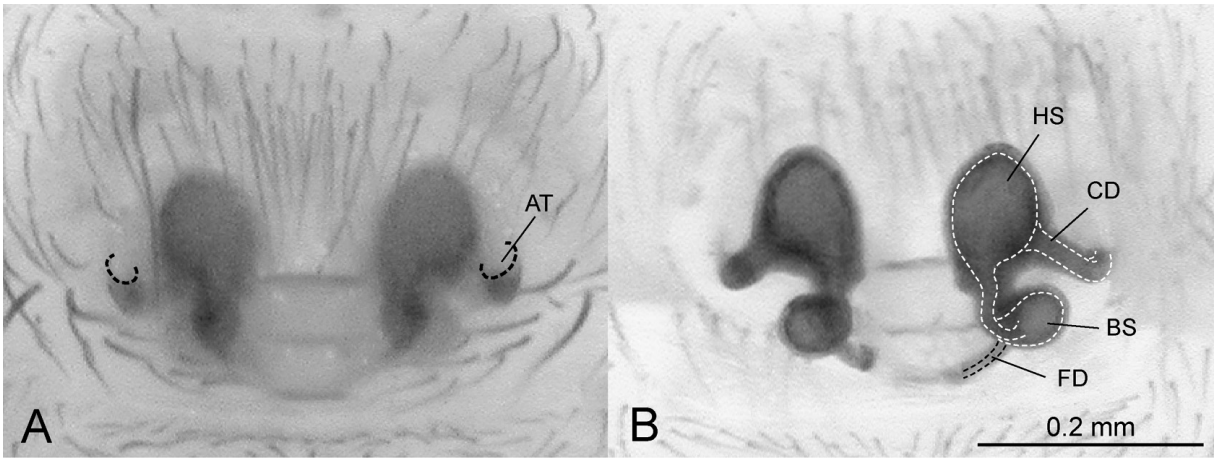

Fig. 16. Female genitalia of *Cybaeus nagaiae* n. sp. (paratype). — A, epigynum, ventral view; B, internal structure, dorsal view. (AT, epigynal atrium; BS, base of spermatheca; HS, head of spermatheca; CD, copulatory duct; FD, fertilization duct.)

Female (paratype). Measurements (in mm). Body length; 3.25; carapace length 1.62, width 1.12, head region width 0.76; abdomen length 1.64, width 1.21; sternum length 0.76, width 0.78. Length of legs (femur/ patella/ tibia/ metatarsus/ tarsus; total): Leg I: 1.11/ 0.47/ 0.92/ 0.78/ 0.52; 3.80. Leg II: 1.03/ 0.46/ 0.80/ 0.74/ 0.48; 3.51. Leg III: 0.88/ 0.41/ 0.61/ 0.71/ 0.42; 3.03. Leg IV: 1.11/ 0.44/ 0.93/ 0.98/ 0.51; 3.97. Ocular area: length 0.22, width 0.46.

Tibia I with 2-2-2-0 ventral spines and 2 prolateral spines; metatarsus I with 2-2-2 ventral spines and 1 prolateral spine; tibia II with 2-2-1 (retromargin)-0 ventral spines and 2 prolateral spines; metatarsus II with 2-2-3 ventral spines and 2 prolateral spines. Promarginal ventral spines of tibia II small.

Genitalia (Fig. 16). Epigynum with a paired inconspicuous atriums. Atrium outside of spermatheca. Spermathecal head larger than spermathecal base.

Type series. Holotype (♂, NSMT-Ar 8502) and paratype (1♀, NSMT-Ar 8503): Hotaino, Kumihama-chô, Kyôtango-shi, Kyoto Pref., Japan, 28-VIII-2005, Yoh Ihara leg. Collected as juvenile, became adult after raring on 14-X-2005 (♂) and 21-X-2005 (♀) respectively.

Other specimens examined. KYOTO PREF. Same locality and date of holotype, 1♂, 28-VIII-2005, Aki Nagai. Collected as juvenile, became adult after raring on 4-X-2005.

Variation. Since the species is known from the type locality alone, the information was not acquired for geographic variation.

Distribution. Known only from the type locality, northwestern part of Kyoto Prefecture, Honshu, Japan (Fig. 1).

Cybaeus nagusa n. sp.

[Japanese name: Nagusa-kogata-namihagumo]

(Figs. 17, 18A, C)

Cybaeus sp. Nagusa, Ihara 2008, p. 92, fig. 13K, p. 93, fig. 14K (Fukusaki-chô, Kanzaki-gun, Hyogo Prefecture).

Diagnosis. Hooked patellar apophysis of male palp is unique within the group. Distinguishable by details of spermathecal shape from other species in female.

Description. Male (holotype). Measurements (in mm). Body length 2.55; carapace length 1.37, width 0.98, head region width 0.61; abdomen length 1.30, width 1.00; sternum length 0.68, width 0.66. Length of legs (femur/ patella/ tibia/ metatarsus/ tarsus; total): Leg I: 0.94/ 0.39/ 0.80/ 0.74/ 0.52; 3.39. Leg II: 0.85/ 0.38/ 0.70/ 0.68/ 0.50; 3.11. Leg III: 0.76/ 0.36/ 0.53/ 0.65/ 0.45; 2.75. Leg IV: 0.96/ 0.38/ 0.81/ 0.91/ 0.52; 3.58. Ocular area: length 0.16, width 0.38.

Anterior eye row almost straight as seen from front, posterior eye row slightly recurved as seen from above. Tibia I with 2-2-2-0 ventral spines and 2 prolateral spines; metatarsus I with 2-2-2 ventral spines and 1 prolateral spine; tibia II with 2-2-1 (retromargin) -0 ventral spines and 2 prolateral spines; metatarsus II with 2-2-3 ventral spines and 2 prolateral spines. Promarginal ventral spine of tibia II small.

Palp (Fig. 17). Tibia relatively short and proximally bent toward prolateral side. Patella as long as tibia. Retrolateral patellar apophysis long and undulate, apically hooked. Conductor with hooked apical element.

Coloration. Head region bright yellowish brown and thoracic region pale yellow, without markings. Chelicerae bright brown, maxillae and labium bright yellowish brown, sternum pale yellow. Legs bright yellowish brown, without annulations. Dorsum of abdomen pale yellow without markings.

Female (one of paratypes). Measurements (in mm). Body length; 3.15; carapace length 1.31, width 0.98, head region width 0.63; abdomen length 1.86, width 1.38; sternum length 0.65, width 0.62. Length of legs (femur/ patella/ tibia/ metatarsus/ tarsus; total): Leg I: 1.11/ 0.47/ 0.92/ 0.78/ 0.52; 3.80. Leg II: 1.03/ 0.46/ 0.80/ 0.74/ 0.48; 3.51. Leg III: 0.88/ 0.41/ 0.61/ 0.71/ 0.42; 3.03. Leg IV: 1.11/ 0.44/ 0.93/ 0.98/ 0.51; 3.97. Ocular area: length 0.18, width 0.24.

Tibia I with 2-2-2-0 ventral spines and 2 prolateral

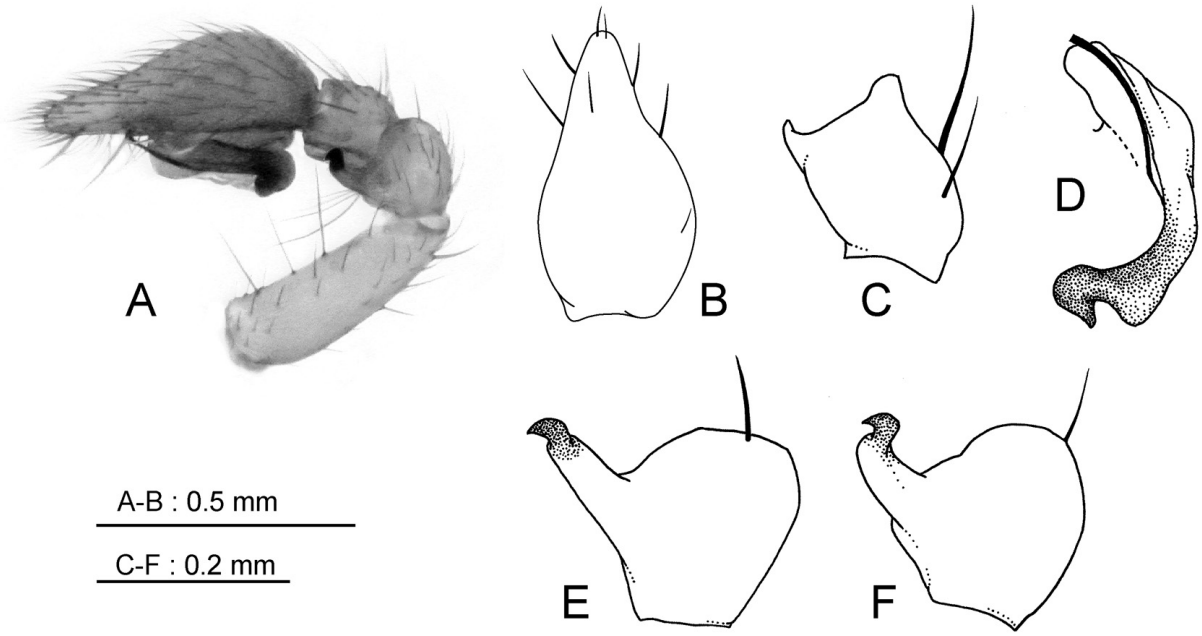

Fig. 17. Male left palp of *Cybaeus nagusa* n. sp. (holotype). — A, lateral view; B, cymbium, dorsal view; C, tibia, dorsal view; D, apical element of conductor, ventrolateral view; E-F, patella, dorsolateral (B) and lateral (C) views.

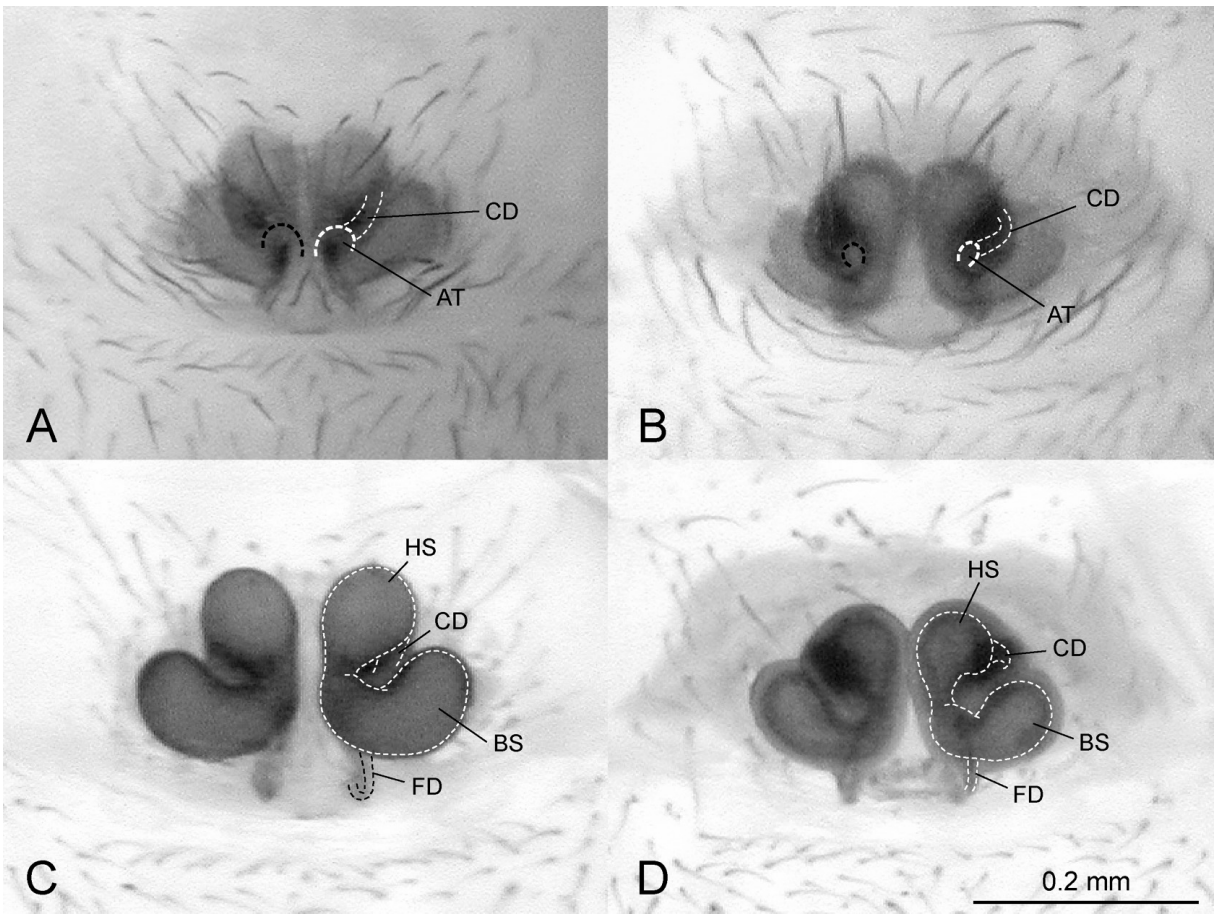

Fig. 18. Female genitalia of *Cybaeus nagusa* n. sp. and *C. nojimai*. — A-B, epigynum, ventral view; C-D, internal structure, dorsal view. A, C, *C. nagusa* (paratype); B, D, *C. nojimai* (Shisô-shi, Hyogo Prefecture). (AT, epigynal atrium; BS, base of spermatheca; HS, head of spermatheca; CD, copulatory duct; FD, fertilization duct.)

spines; metatarsus I with 2-2-2 ventral spines and 1 prolateral spine; tibia II with 2-2-1(retromargin)-0 ventral spines and 2 prolateral spines; metatarsus II with 2-2-3 ventral spines and 2 prolateral spines. Promarginal ventral spines of tibia II small.

Genitalia (Fig. 18A, C). Epigynum with a paired atriums. Atriums near in the center of epigynum. Spermathecal stalk short, spermathecal head and spermathecal base joined each other. Spermathecal base extended and bent.

Type series. Holotype (♂, NSMT-Ar 8504): Nagusa-notaki Falls, Fukusaki-chô, Kanzaki-gun, Hyogo Pref., Japan, 230 m alt., 3-XI-2005, Yoh Ihara leg. Paratypes (2♀, NSMT-Ar 8505-8506): Same locality of holotype, 26-III-2007, Y. Ihara.

Other specimens examined. HYOGO PREF. Same locality of holotype: 1♀, 24-IX-1994, YI; 4♀, 26-III-2007, YI.

Variation. Since the species is known from the type locality alone, no information is available for geographic variation.

Range of body size (in mm, means in parentheses; female n＝7): Carapace length, 1.14-1.40 (1.31); carapace width, 0.79-0.97 (0.90); length of tibia I, 0.61-0.77 (0.72).

Distribution. Known only the type locality, central part of Hyogo Prefecture, Honshu, Japan (Fig. 1).

Remarks. Female genitalia of this species resemble that of *Cybaeus nojimai* (Fig. 18, cf. A and B). However, epigynal atriums and copulatory ducts of this species are close to each other at center of epigynum compared with *C. nojimai*. Further, internal structure of female genitalia of these species are distinct each other. Spermatheca of this species is more robust than that of *C. nojimai* (Fig. 18, cf. C and D). In male, they are easily distinguished by their retrolateral patellar apophysis and other parts of palp.

Discussion

Komatsu (1968) divided the genus *Cybaeus* L. Koch 1868 (*sensu lato*) into three genera: *Cybaeus* L. Koch 1868 (*sensu stricto*), *Dolichocybaeus* Kishida in Komatsu 1968, and *Heterocybaeus* Komatsu 1968 on the basis of the structure of female genitalia, retreat type and geographic distributional pattern. However, accumulation of the species that have been newly described under the genus *Cybaeus* (*sensu lato*) after Komatsu (1968) has revealed that female genitalia of the group are far more diverse than Komatsu's expectation and cannot be separated into three types recognized by Komatsu (1968). Furthermore, at least *Cybaeus* (*sensu stricto*) and *Dolichocybaeus* are not distinguishable also by types of retreat.

It is likely that *Heterocybaeus* is a monophyletic species group by having a unique hexagonal retreat type and an aggregation of distributional ranges. The *hiroshimaensis*-group can be safely considered as a monophyletic group, too, like *Heterocybaeus*. Thus, it is logically possible to treat such monophyletic groups as independent genera. However, relationships of "*Heterocybaeus*" or the *hiroshimaensis*-group to the remaining members of *"Cybaeus"* are still unclear. Hence, it seems that separation of these monophyletic groups from the genus *Cybaeus* would generate a huge paraphyletic group comprised by other congeners. On top of that, practical merits to split the genus *Cybaeus* (*sensu lato*) are very scarce. Thus, I prefer to treat the *hiroshimaensis*-group and *Heterocybaeus* under *Cybaeus* (*sensu lato*), until phylogeney of the genus *Cybaeus* (*sensu lato*) based on sound methodology is available in the future.

Komatsu (1968) had only scanty information on their retreats and geographic distributions. Consequently, he confused their retreat types and geographic distributional pattern between *Cybaeus* (*sensu stricto*) and *Dolichocybaeus*. In addition, female genitalia of both genera also cannot be distinguished based on the arrangement of spermathecal components in current taxonomic study. My judgment is that at least differences between *Cybaeus* (*sensu stricto*) and *Dolichocybaeus* are obscure and neither of them is good enough to be recognized as a monophyletic group, and so *Dolichocybaeus* should be treated as *Cybaeus* even in the narrow sense.

Inclusion of *Heterocybaeus* and *Dolichocybaeus* into *Cybaeus* (*sensu lato*) was first proposed by Yaginuma (1977, 1986) without any explicit indication as "New Synonymy" by a single reason that they are too finely split compared with genera of other spider families in Japan. Supposedly by these situations, both *Heterocybaeus* and *Dolichocybaeus* have still been considered valid in the spider catalogues of the world (e.g. Platnick 2009). However, by the reasons explained above, tripartite division of Japanese species of *Cybaeus* (*sensu lato*) into *Cybaeus* (*sensu stricto*), *Dolichocybaeus*, and *Heterocybaeus* cannot be supported even if the latter three were downgraded into categories below the generic level. Thus, I placed *Dolichocybaeus*, and *Heterocybaeus* in the synonymy of the genus *Cybaeus* with the words "NEW SYNONYMY" to draw the reader's attention.

Acknowledgments

I wish to express my hearty thanks to Prof. Nobuo Tsurusaki, Tottori University, for reading manuscript of the present paper and offering specimens. I also thank Mr. Koichi Nojima for offering specimens and Ms. Aki Nakajima (Nagai) for helping field collecting and rearing immature spiders of the new species.

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Received August 5, 2009/Accepted October 8, 2009